

CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claim 1 (original) A tire condition sensor unit for association with a tire of a vehicle and for communicating a tire condition to a vehicle-based unit, said tire condition sensor unit comprising:

sensor means for sensing the tire condition;

radio frequency transmitter means, operatively connected to said sensor means, for transmitting a radio frequency signal that indicates the sensed tire condition; and

low frequency receiver means, operatively connected to said radio frequency transmitter means, for receiving a low frequency initiation signal and for causing said radio frequency transmitter means to transmit the radio frequency signal indicative of the sensed tire condition in response to receipt of the low frequency initiation signal.

Claim 2 (original) A tire condition sensor unit as set forth in claim 1, wherein said tire condition sensor unit and said vehicle-based unit are part of a tire condition communication system and said low frequency receiver means

is a first part of communication means of said tire condition communication system, a low frequency transmitter means of said tire condition communication system is a second part of said communication means that is operatively connected to said vehicle-based unit and that is for transmitting the low frequency initiation signal, said communication means for communicating a request from said vehicle-based unit to said tire condition sensor unit via the low frequency initiation signal to cause the transmission of the radio frequency signal.

Claim 3 (original) A tire condition sensor unit as set forth in claim 2, wherein said low frequency receiver means and said low frequency transmitter means include first and second magnetic induction antennas, respectively.

Claim 4 (original) A tire condition sensor unit as set forth in claim 2, wherein said low frequency receiver means is also for receiving a signal such that said radio frequency transmitter means transmits a signal that indicates an identification to said vehicle-based unit.

Claim 5 (original) A tire condition sensor unit as set forth in claim 4, wherein said vehicle-based unit includes means for storing the identification.

Claim 6 (original) A tire condition sensor unit as set forth in claim 5, wherein said vehicle-based unit includes means for pairing the stored identification with a tire location.

Claim 7 (original) A tire condition sensor unit as set forth in claim 2, wherein said vehicle-based unit includes means utilizing vehicle speed to vary rate of repeat occurrence of the transmission of the initiation signal.

Claim 8 (original) A tire condition sensor unit as set forth in claim 1, including controller means, providing the operative connection between said sensor means, said radio frequency transmitter means, and said low frequency receiver means, for controlling operation of said tire condition sensor means.

Claim 9 (original) A tire condition sensor unit as set forth in claim 1, including memory means for holding a fixed identification associated with the tire, said radio frequency transmitter means is operatively connected to said memory means, and said transmitted radio frequency signal also indicates the fixed identification associated with the tire.

Claim 10 (original) A tire condition sensor unit as set forth in claim 9, including controller means, providing the operative connection between said sensor means, said radio frequency transmitter means, said low frequency receiver means and said memory means, for controlling operation of said tire condition sensor means.

Claim 11 (original) A tire condition sensor unit as set forth in claim 9, wherein said memory means is capable of learning new identifications.

Claim 12 (original) A tire condition sensor unit as set forth in claim 9, wherein said tire condition sensor unit and said vehicle-based unit are part of a tire condition communication system and said low frequency receiver means is a first part of communication means of said tire condition communication system, a low frequency transmitter means of said tire condition communication system is a second part of said communication means that is operatively connected to said vehicle-based unit and that is for transmitting the low frequency initiation signal, said communication means for communicating a request from said vehicle-based unit to said tire condition sensor unit via

the low frequency initiation signal to cause the transmission of the radio frequency signal.

Claim 13 (original) A tire condition sensor unit as set forth in claim 12, wherein said communication means does not convey identification information.

Claim 14 (original) A tire condition sensor unit as set forth in claim 1, wherein said sensor means senses tire inflation pressure as the sensed tire condition.

Claim 15 (original) A tire condition communication system for a vehicle, said system comprising:

sensor means, associated with a tire, for sensing at least one tire condition;

radio frequency transmitter means, associated with the tire and operatively connected to said sensor means, for transmitting a radio frequency signal that indicates the sensed tire condition; and

communication means, having a first portion associated with the tire and operatively connected to said radio frequency transmitter means and a second portion associated with the vehicle, for communicating a request from the vehicle to said radio frequency transmitter means

to transmit the radio frequency signal that indicates the sensed tire condition.

Claim 16 (original) A tire condition communication system as set forth in claim 15, wherein said first portion of said communication means includes low frequency receiver means for receiving a low frequency initiation signal and for causing said radio frequency transmitter means to transmit the radio frequency signal in response to receipt of the low frequency initiation signal.

Claim 17 (original) A tire condition communication system as set forth in claim 16, wherein said communication means includes first and second magnetic induction antennas.

Claim 18 (original) A tire condition communication system as set forth in claim 15, including radio frequency receiver means, associated with the vehicle, for receiving the radio frequency signal that indicates the sensed tire condition.

Claim 19 (original) A tire condition communication system as set forth in claim 18, wherein said sensor means senses tire inflation pressure as the sensed tire condition.

Claim 20 (original) A tire condition communication system as set forth in claim 18, including indicator means for providing an indication of sensed tire condition.

Claim 21 (original) A tire condition communication system as set forth in claim 20, wherein said indicator means also for indicating tire location.

Claim 22 (original) A tire condition communication system as set forth in claim 20, wherein said radio frequency transmitter means also for transmitting an identification, said system including means for using the identification to determine tire location, and said indicator means also for indicating tire location.

Claim 23 (original) A tire condition communication system as set forth in claim 22, including means for storing identifications and associating identifications with respective tire locations.

Claim 24 (original) A tire condition communication system as set forth in claim 23, including means for updating the stored identifications.

Claim 25 (original) A tire condition communication system as set forth in claim 24, wherein said means for updating the stored identifications includes means for monitoring the number of times an identification is received.

Claim 26 (original) A tire condition communication system as set forth in claim 15, including means utilizing vehicle speed to vary rate of operation of said communication means.

Claim 27 (original) A tire condition communication system as set forth in claim 15, including memory means, associated with the tire, for holding a fixed identification associated with the tire, said radio frequency transmitter means also for transmitting the radio frequency signal to indicate the fixed identification.

Claim 28 (original) A tire condition communication system as set forth in claim 27, including memory means, associated with the vehicle, for holding identification values for comparison with the fixed identification indicated by the received radio frequency signal.

Claim 29 (original) A tire condition communication system as set forth in claim 27, wherein said memory means is capable of learning new identifications.

Claim 30 (original) A tire condition communication system as set forth in claim 27, wherein said communication means does not convey identification information.

Claim 31 (original) A tire condition communication system for a vehicle, said system comprising:

sensor means, associated with a tire, for sensing at least one tire condition;

memory means, associated with the tire, for holding a fixed identification associated with the tire;

radio frequency transmitter means, associated with the tire and operatively connected to said sensor means and said memory means, for transmitting a radio frequency signal that indicates the fixed identification and the sensed tire condition; and

communication means, having a first portion associated with the tire and operatively connected to said radio frequency transmitter means and a second portion associated with the vehicle, for communicating a request from the vehicle to said radio frequency transmitter means

to transmit the radio frequency signal that indicates the fixed identification and the sensed tire condition.

Claim 32 (original) A tire condition communication system as set forth in claim 31, wherein said first portion of said communication means includes low frequency receiver means for receiving a low frequency initiation signal and for causing said radio frequency transmitter means to transmit the radio frequency signal in response to receipt of the low frequency initiation signal.

Claim 33 (original) A tire condition communication system as set forth in claim 32, wherein said communication means includes first and second magnetic induction antennas.

Claim 34 (original) A tire condition communication system as set forth in claim 31, including radio frequency receiver means, associated with the vehicle, for receiving the radio frequency signal that indicates the fixed identification and the sensed tire condition, and memory means, associated with the vehicle, for holding identification values for comparison with the fixed identification indicated by the received radio frequency signal.

Claim 35 (original) A tire condition communication system as set forth in claim 31, wherein said memory means is capable of learning new identifications.

Claim 36 (original) A tire condition communication system as set forth in claim 35, including means for counting the number of receptions of an identification to determine whether to learn a new identification.

Claim 37 (original) A tire condition communication system as set forth in claim 31, wherein said communication means does not convey identification information.

Claim 38 (original) A tire condition communication system as set forth in claim 31, wherein said sensor means senses tire inflation pressure as the sensed tire condition.

Claim 39 (original) A tire condition communication system as set forth in claim 31, including indicator means for providing an indication of sensed tire condition.

Claim 40 (original) A tire condition communication system as set forth in claim 39, wherein said indicator means also for providing an indication of tire location with the indication of sensed tire condition.

Claim 41 (original) A tire condition communication system as set forth in claim 39, including means for controlling said communication means responsive to a vehicle condition.

Claim 42 (original) A tire condition communication system as set forth in claim 41, wherein the vehicle condition is vehicle speed.

Claim 43 (original) A method of communicating tire condition information from a tire condition sensor unit to a vehicle-based unit, said method comprising:

outputting, in response to control from the vehicle-based unit, a low frequency initiation signal for reception by the tire condition sensor unit; and

outputting, in response to receipt of the low frequency initiation signal, a radio frequency response signal that conveys the tire condition information from the tire condition sensor unit for reception by the vehicle-based unit.

Claim 44 (original) A method of communicating tire condition information from a tire condition sensor unit to a vehicle-based unit, said method comprising:

outputting, in response to control from the vehicle-based unit, a low frequency signal for reception by the tire condition sensor unit; and

outputting a radio frequency signal that conveys a fixed tire identification and the tire condition information from the tire condition sensor unit for reception by the vehicle-based unit.

Claim 45 (original) A method as set forth in claim 44, including indicating the sensed condition and tire location to a vehicle operator.

Claim 46 (original) A method as set forth in claim 44, including controlling the step of outputting the low frequency signal for reception by the tire condition sensor unit in response to a vehicle condition.

Claim 47 (original) A method as set forth in claim 44, including comparing the conveyed tire identification with a stored identification at the vehicle.

Claim 48 (original) A method as set forth in claim 47, including updating the stored identification at the vehicle via provision of a new identification from a tire condition sensor unit.

Claim 49 (original) A method of communicating tire condition information from a plurality of tire condition sensor units to a vehicle-based unit, said method comprising:

sequentially outputting, in response to control from the vehicle-based unit, low frequency initiation signals, each low frequency initiation signal being for reception by a different tire condition sensor unit; and

each tire condition sensor unit outputting, in response to receipt of the respective low frequency initiation signal, a radio frequency response signal that conveys the tire condition information from that tire condition sensor unit for reception by the vehicle-based unit.

Claim 50 (original) A method as set forth in claim 49, wherein said step of outputting the radio frequency response signals includes outputting the response signals to convey fixed tire identifications.

Claim 51 (original) A method as set forth in claim 50, including indicating the sensed conditions and tire locations to a vehicle operator.

Claim 52 (original) A method as set forth in claim 50, including comparing the conveyed tire identifications with stored identifications at the vehicle.

Claim 53 (original) A method as set forth in claim 49, including updating a stored identification at the vehicle via provision of a new identification from a tire condition sensor unit.

Claim 54 (original) A method as set forth in claim 49, including controlling the step of outputting the low frequency signals for reception by the tire condition sensor units in response to a vehicle condition.

Claim 55 (original) A method of communicating tire condition information from a plurality of tire condition sensor units to a vehicle-based unit, said method comprising:

sequentially outputting, in response to control from the vehicle-based unit, low frequency signals, each low frequency signal being for reception by a different tire condition sensor unit; and

each tire condition sensor unit outputting a radio frequency signal that conveys a fixed tire identification

and the tire condition information from that tire condition sensor unit for reception by the vehicle-based unit.

Claim 56 (original) A method as set forth in claim 55, including indicating the sensed conditions and tire locations to a vehicle operator.